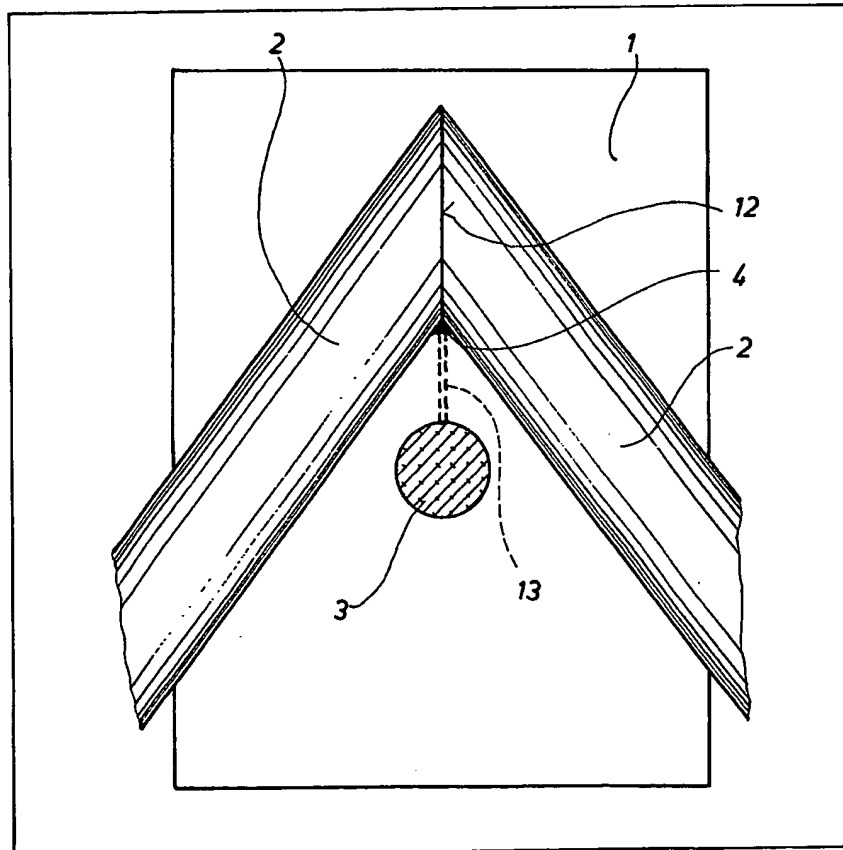


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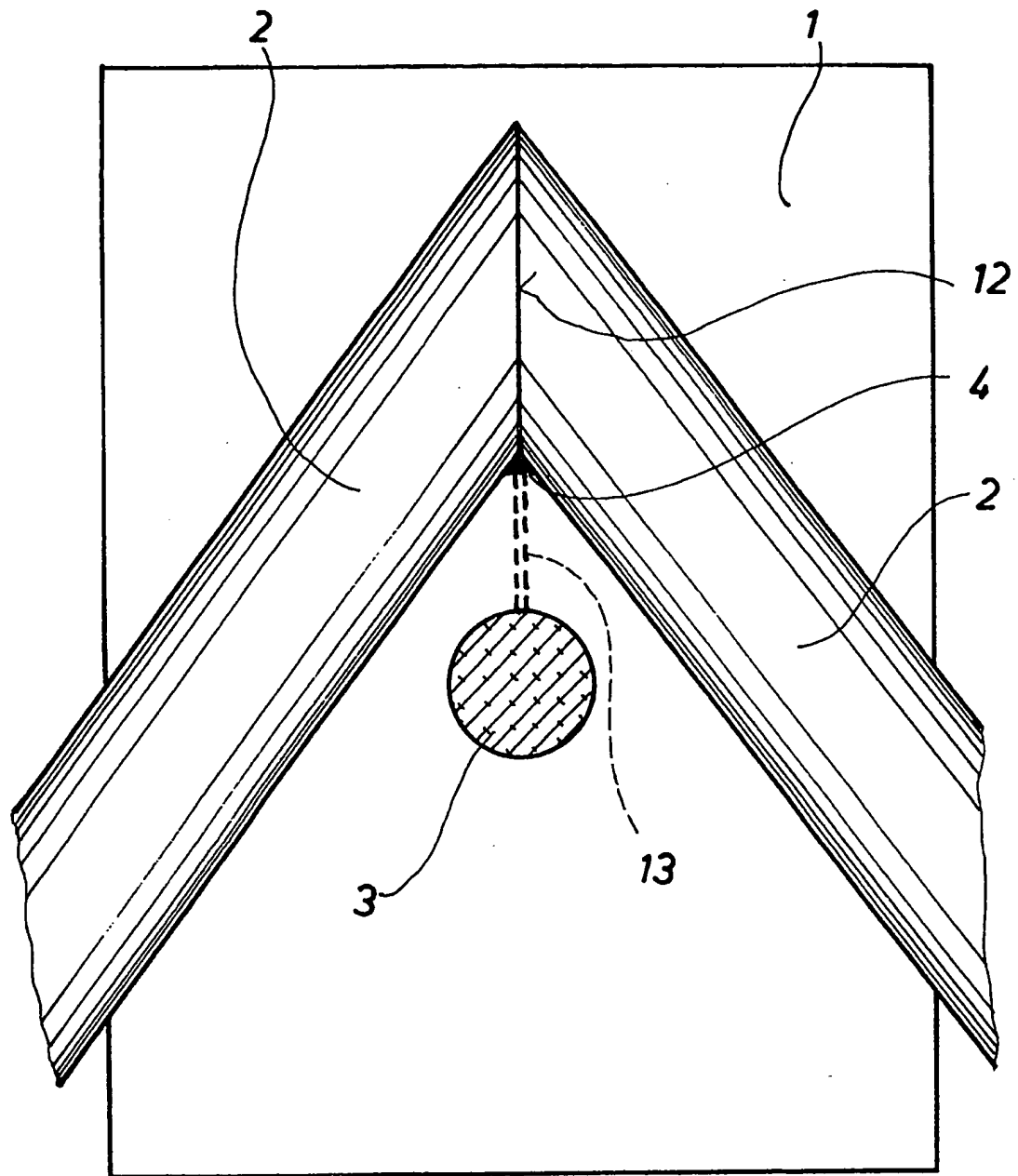
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(54) **Joining the ends of extruded profiles made of rubber or a rubber-like plastics material**

(57) The adjacent, mitred ends of extruded sealing profiles, which are combined to a form a frame and are made of rubber or rubber-like plastics materials, are usually adhesively joined together in a small mould. According to the invention, the resistance to tearing of the adhesive connection thereby produced is substantially increased when an additional substance, such as rubber or a rubber-like plastics material, is simultaneously injected into the internal angular region of the corner connection.



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SPECIFICATION

A method and device for joining the ends of extruded profiles made of rubber or a rubber-like plastics material

The present invention relates to a method and device for joining the ends of extruded profiles, more especially sealing strips for windows of doors or vehicles and buildings, such profiles being joined together with an angle therebetween and being made of rubber or a rubber-like plastics material, the mitred ends being integrally joined together by the simultaneous effect of pressure and heat.

Such sealing strips, which are used as edgings, for example, for window-panes, boot openings and similar purposes, are generally required in the form of circular, endless sealing frames. For practical purposes, therefore, it has already become general practice to supply the strips ready for installation as an endless structure by combining their ends, such strips having been obtained by cutting-off lengths of extruded profiles produced in a straight line. It was anticipated that the adhesive connection or bonded joint formed by conventional means, for example, by vulcanisation or by the use of an adhesive, between the neatly mitred end faces adapted to one another could tolerate all of the dynamic stresses produced by the deformations occurring during use of the seals. Surprisingly, however, cases of premature failure were repeatedly experienced, such failure resulting undoubtedly from the sealing frames being excessively stretched during installation. In these cases, the otherwise regular endless connection of the frames was partially torn, starting from the internal vertex of the angle formed by the adjacent frame portions, more acute angles obviously causing more intensive tearing and, as a consequence thereof, even wider cracks. Despite a considerable amount of work, no basic remedy was found in tests carried out to overcome these problems by paying particular attention when preparing and forming the adhesive connections and also when installing the finished sealing frames, so that it seemed inevitable hitherto to add a certain amount of supplementary material.

In contrast thereto, the invention seeks to increase the resistance to tearing of the adhesive connection in the frame corners and to ensure integral adhesion in all of the surface areas, irrespective of the considerable deformation and tearing induced during the assembly operations.

According to the present invention there is provided a method for joining the ends of extruded profiles, more especially sealing strips for windows or doors of vehicles and buildings, such profiles being joined together with an angle therebetween and being made of rubber or a rubber-like plastics material, the mitred ends being integrally joined together by the simultaneous effect of pressure and heat, in which an additional substance is introduced in its plastic state, under pressure, into the internal angular region over at least a portion of the connecting joint and is integrally connected to the covered joint edges.

If, as is frequently the case, the extruded profile is comprised of a support or holding portion and a sealing portion, the additional substance such as rubber or a plastics material, is advantageously introduced in the region of the support portion only.

The invention provides an external reinforcement for the endless connections, such reinforcement being, on the one hand, simple to apply and, on the other hand, not interfering with the proper seating of the sealing frames, nor hindering the assembly operations. In all cases, it has proved adequate to provide the additional substance solely in the critical, internal angle vertex, thereby satisfying practical demands under all circumstances with reduced amounts, such that the additional substance forms only an arcuate element - when viewed with respect to its cross-section - for spanning the angular region in the manner of a concave groove or channel. It was therefore possible to reduce the supplementary material, which could scarcely be influenced by known means, to a small fraction of the amount which was customarily used hitherto - and this was done, however, for different reasons.

A device suitable for carrying out the method of the present invention comprises a heatable mould, such mould having a removable closure member and accommodating the end portions of the combined extruded profiles, in which the mould is provided with a press cylinder which is open in the direction of the closure member, such press cylinder being connected to the cavity of the mould via a lateral extrusion bore and temporarily accommodating the additional substance, and the closure member is provided with a press piston which plunges into the press cylinder when the mould is closed.

A press cylinder according to the invention may be incorporated into known moulds, hitherto used for producing the endless connections, with relatively little work involved, and similarly no problems are encountered also when mounting an associated, single press piston on the closure member. In order to use the device of the invention only suitably measured amounts of an additional caoutchouc, rubber or plastics material mixture need to be introduced into the press cylinder, since such amounts are forced, under pressure, through the lateral bore towards the intended internal angular region when the closure member is mounted and the mould is completely closed, and such amounts are brought into adhesive bonding with the pertinent portions of the strip ends, without further assistance, during the course of the vulcanisation or cross-linking operation being used.

The present invention will be further illustrated, by way of example, with reference to the accompanying drawing in which the single figure is a schematic plan view of a portion of a device in accordance with the invention.

The drawing is a plan view of the opened underneath portion 1 of a mould which accommodates the two end portions 2 of a profiled strip and is used to produce an integral connection between such end portions by means of vulcanisation. The end faces of the strip, which meet each other at an acute angle, are mitred and enclose a butt joint 12 therebetween.

An upwardly open press cylinder 3 is provided in the vicinity of the internal vertex point of the frame angle in the form of a simple blind hole or a blind-end bore, together with an extrusion bore 13 which is laterally provided in the base region of the press cylinder 3 and extends towards the angle vertex. In exact conformity therewith, an attachment member forming the press piston is provided on the closure member (not shown) of the mould. As a consequence thereof, the arrangement is such that, once the closure member has been mounted upon the underneath portion 1 of the mould, the piston plunges into the press cylinder 3 and forces the additional substance contained therein, such as caoutchouc, rubber or plastics material, through the extrusion bore 13 towards the strip ends 2 in the direction of the internal corner region. In the internal angular region of the connection, the finished sealing frames removed from the mould are then provided with a concave groove or channel 4 which partially spans the connecting joint 12.

CLAIMS

1. A method for joining the ends of extruded profiles, more especially sealing strips for windows or doors of vehicles and buildings, such profiles being joined together with an angle therebetween and being made of rubber or a rubber-like plastics material, the mitred ends being integrally joined together by the simultaneous effect of pressure and heat, in which an additional substance is introduced in its plastic state, under pressure, into the internal angular region over at least a portion of the connecting joint and is integrally connected to the covered joint edges.

2. A method as claimed in claim 1, in which the inserted additional substance is moulded to form an arcuate element which spans the internal angular region in the manner of a concave channel or groove.

3. A method as claimed in claim 1 or 2, in which the additional substance is rubber or a plastics material.

4. A method as claimed in claim 1, 2 or 3, for joining the ends of extruded profiles which are each comprised of a support portion and a sealing portion, in which the additional substance is only introduced in the region of the support portion.

5. A method for joining the ends of extruded profiles as claimed in any preceding claim, substantially as hereinbefore described.

6. A device for carrying out the method as claimed in any one of claims 1 to 5, including a heatable mould, such mould having a removable closure member and accommodating the end portions of the combined extruded profiles, in which the mould is provided with a press cylinder which is opened in the direction of the closure member, such press cylinder being connected to the cavity of the mould via a lateral extrusion bore and temporarily accommodating the additional substance, and the closure member is provided with a press piston which plunges into the press cylinder when the mould is closed.

7. A device for joining the ends of extruded profiles, substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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